

long.”¹ In the American plant, on the other hand, fronds only 3 feet long would be considered small, those of 5 or 6 feet in length being common, while luxuriant fronds are said to exceed 10 feet (3 m.). The pinnae of the American plant vary, according to luxuriance, from 2–7 inches (5–18 cm.) in length, and the stipe of the sterile frond from $2\frac{3}{4}$ –14 inches (7–35.5 cm.) in length.

Departing from the European *Matteuccia Struthiopteris* in nearly all details and quite isolated from it, the North American plant seems to be, as treated by the earlier students of our flora, a distinct American species which should be called

MATTEUCCIA nodulosa (Michx.), n. comb. *Onoclea nodulosa* Michx. Fl. Bor. Am. ii. 272 (1803) as to description and type-specimen, not as to synonyms and habitat; Schkuhr, Krypt. Gew. i. 96, t. 104 (1809). *Struthiopteris pensylvanica* Willd. Sp. v. 289 (1810). *S. nodulosa* Desv. Mém. Soc. Linn. Paris, vi. pt. 2, 287 (1827). *S. germanica*, var. *pensylvanica* Lowe, Ferns, Brit. and Exot. ii. 138 (1862).

GRAY HERBARIUM.

THE HEMLOCK SPRUCE.

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IN RHODORA for March, 1915, Mr. Alfred Rehder published a criticism of my paper on “the correct name of the Hemlock Spruce” which appeared in the issue of the Bulletin of the Torrey Botanical Club for December, 1914. I shall not attempt to answer the salient points of his discussion in the order in which they are given but will take analogous but non-contiguous features, and bring them together in order to show as clearly as possible the inconsistencies and fallacies of his statements and conclusions.

In dealing with specific names and the species which they represent two axioms are in general use. The first is that any species which has had the type specifically mentioned or designated by the author stands or falls with that type; the author’s specific name cannot be transferred to another plant. The other is that where the type has

¹ Asch. & Graebn. Syn. i. 43 (1896).

not been specifically mentioned or designated, the first author revising the species must of necessity make his own choice as to which element shall bear the name. That choice should be, and perhaps is, generally, determined by the internal evidence.

Mr. Rehder fails to see wherein my reference to Article 46 of the Vienna Rules bears upon the case at issue since the Article mentioned treats of the combining of two or more species and not of the division of one. The Vienna Rules are general laws for the guidance of such botanists as have subscribed to them. In the treatment of species, the first author revising them is given, under certain conditions, the choice of making his own interpretation as to the application of the specific names and subsequent revisers cannot alter this interpretation. The Vienna Congress in handling this subject relating to the treatment of species first considers the combining of species and it is here that the general law making the author's choice of name, under certain conditions, permanent, is expressed. When considering the division of a species, the Congress, acting upon the basis that "brevity is the soul of wit," declined, and justly so, to perpetrate a needless repetition.

In regard to the detailed description of *Pinus Balsamea* Linnaeus, which Mr. Rehder fails to see is not restrictive, it may be remarked that the leaves of *Tsuga caroliniana*, a species growing in Virginia, may be notched at the end, thus coming under the designation *sub-emarginatis*. Also that the leaves of *A. Fraseri* may be either emarginate or obtuse. Rehder claims that it had not been discovered at the time *P. Balsamea* was published. It would be more accurate to say that it was not *recognized* at the time as a *distinct species* but there is no evidence to prove that it was not known and included in *Pinus Balsamea*. It must therefore be considered in any discussion of the subject. The leaves of the Balsam Fir from Vermont show an emarginate apex but those from the Lake Superior district have no such markings but are as rounded and as obtuse as the leaves of the Hemlock. The leaves of the Hemlock Spruce are as broad as those of the Balsam Fir so they are *not excluded from consideration* by a comparison of the latter with those of the Silver Fir. The white bands on the under side of the leaves in the Hemlock are usually composed of four rows of stomata but frequently are of five or six and sometimes of seven or eight; those on leaves of the Balsam Fir of Lake Superior are generally of seven or eight rows but are frequently of any number between four and eight inclusive while those on trees from Vermont

from three to eight with six about the general run. It will therefore be seen from the foregoing that the Linnaean detailed description of *Pinus Balsamea* is not only not characteristic, for the leaves may be entire and obtuse and the rows of stomata as low as three, but it is broad enough to include the leaves of what are now considered as four species included under two genera. Not only that but the real characters, found in the cones, upon which the genera and species are separated are not even touched upon by Linnaeus. The Linnaean description may, therefore, mean any one of two or more species and *Pinus Balsamea* Linn., as to the specific name, is the Balsam Fir; as to the description, an undefinable aggregate; and as to the synonyms, the Hemlock Spruce.

Rehder claims that the Gronovian synonym, the Hemlock Spruce, is the type of *Pinus canadensis* Linn. because the Linnaean diagnosis "is taken nearly literally from the synonym of Gronovius." Further on he admits *Abies canadensis* Miller to be a new name for a different species because "Miller does not quote *Pinus canadensis* Linnaeus as a synonym." Miller does not quote the binomial, it is true, but he *does use the Linnaean specific name and he does use the Linnaean diagnosis* upon which Rehder lays so much stress and which "is taken nearly literally from the synonym of Gronovius. This shows as clearly as if " Miller "had expressly designated the Gronovian plant as the type of his species, that his " *Abies canadensis* "is based primarily on the plant described by Gronovius." In other words, if the Linnaean diagnosis is the type of *Pinus canadensis* to the exclusion of other matter not conspecific with it, the same must be true of Miller's *Abies canadensis* for the diagnosis and the specific name are the same in each and have the same origin thus making the two binomials synonymous even though Miller did not quote *Pinus canadensis* as a synonym. Rehder, therefore, fails to prove that *Abies canadensis* Miller is different from *Pinus canadensis* Linnaeus. Furthermore, since he insists that the Hemlock Spruce is the type of the latter it must also be the type of the former because the two, according to his own method of reasoning, have been proved to be synonymous. The fallacy is so evident that it needs no comment.

Rehder doubts that Miller intended to transfer the Linnaean species from *Pinus* to *Abies* and that if he actually had such intention he misapplied the name under the laws of priority. The only law of priority that will apply here is the one giving the first author revising

a species the privilege of choosing the specific name under certain conditions — Article 46 which, by inference, covers the division of species as well as the combination of them. *Pinus canadensis* Linn. is an aggregate without a designated type consisting of the White Spruce and the Hemlock Spruce. In transferring from *Pinus* to *Abies* Miller separated the two elements retaining the specific name and diagnosis for the White Spruce (the synonym of Miller) and giving a new name *Abies americana* to the Hemlock (the synonym of Gronovius). It is, therefore, very evident that Miller not only knew what he was about but that he intended to transfer the species and that the name was not misapplied since he used it in the sense that Linnaeus did — “*canadensis*” being indicative of the White Spruce, as *Balsamea* is of the Balsam Fir. Under the above mentioned Article this choice cannot be changed. As above shown Rehder completely fails to prove that the specific name “*canadensis*” was misapplied by Miller; he admits that *Abies canadensis* is the White Spruce; yet refers the *Pinus canadensis*, a synonym, to the Hemlock Spruce; the fallacy of Rehder’s argument is very apparent.

The whole discussion revolves about the determination of a type for *Pinus canadensis* Linnaeus. If it can be shown that Linnaeus actually had the Hemlock Spruce in view for his *P. canadensis* it must be considered the type and in this case it must be admitted that Miller has misapplied the name. But did he? Will Mr. Rehder admit that Miller had the Hemlock in view for his *A. canadensis* because he used the Linnaean diagnosis which “was taken almost literally from the synonym of Gronovius?” Certainly not! Nor any one else! Then why for *P. canadensis*? In the first edition of the Species Plantarum Linnaeus placed two Hemlock synonyms under *P. Balsamea*; in the second edition he admitted another species, *P. canadensis*, to include the White Spruce and one of the synonyms (the more recent) of the Hemlock Spruce leaving the other (the older) where originally placed, under *P. Balsamea*. When Linnaeus used these synonyms he gave them the status of post-Linnaean publications and the older of these in point of actual publication, that of Plukenet, must therefore, under the law of priority, be considered to be the type of the Hemlock Spruce. This did not receive a binomial name until Miller named it *Abies americana*. But what was the incident that induced Linnaeus between 1753 and 1763 to establish a new species in this group of plants? Was it from anything Plukenet or Gronovius had written

during that decade? Most certainly not, for one had been long dead and the other had published nothing *new* upon the subject. It is not probable that a reperusal of the old writings had anything to do with the matter as these had already been thoroughly studied for the first edition; also the fact that the synonyms were separated and placed under two species, to neither of which they belonged, is very conclusive evidence that Linnaeus neither knew the Hemlock Spruce nor had any real conception of its status as a species and therefore could not have considered it a type. What then was the controlling factor in the establishment of *Pinus canadensis*? During the decade above referred to Miller published and described under the old style of nomenclature four species of this group and later illustrated at least one of them, the White Spruce. These publications of Miller brought the species prominently before Linnaeus who readily recognized the claims of the White Spruce to specific rank and, *on the strength of Miller's publications*, accorded it such as *Pinus canadensis* in the second edition of the Species Plantarum. Rehder claims that the specific name in *Pinus Balsamea* is indicative of what Linnaeus meant and furthermore that it shows Linnaeus did not get all his information regarding the Balsam Fir from the Hemlock synonyms cited under it. Does not the same reasoning apply when considering *P. canadensis*? Or will Mr. Rehder deny that it does and insist that Linnaeus obtained the specific name "*canadensis*" *from the writings of Gronovius on Virginia and the Hemlock Spruce*? The entire internal evidence shows conclusively that Linnaeus had the White Newfoundland Spruce in mind when he published *Pinus canadensis* notwithstanding he drew up his diagnosis from Gronovius, which, under the circumstances, was unfortunate. The proper specific name, therefore, for the Hemlock Spruce is the one first applied to it, that of *americana*, and the correct binomial, *Tsuga americana* (Miller) Farwell.

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